



IGBT

# FMG2G75US120

## Molding Type Module

### General Description

Fairchild IGBT Power Module provides low conduction and switching losses as well as short circuit ruggedness. It's designed for the applications such as motor control, uninterrupt power supplies (UPS) and general inverters where short-circuit ruggedness is required.

### Features

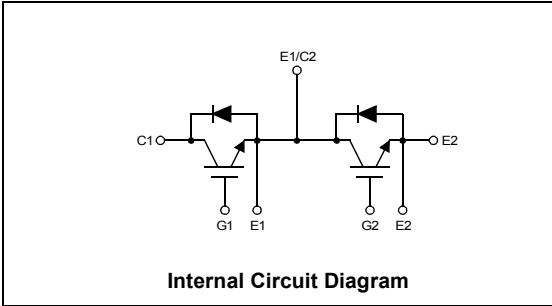
- Short Circuit Rated Time; 10us @  $T_C = 100^{\circ}C$ ,  $V_{GE} = 15V$
- High Speed Switching
- Low Saturation Voltage :  $V_{CE(sat)} = 2.6 V @ I_C = 75A$
- High Input Impedance
- Fast & Soft Anti-Parallel FWD
- UL Certified No.E209204

### Application

- AC & DC Motor Controls
- General Purpose Inverters
- Weldings
- Servo Controls
- UPS



Package Code : 7PM-GA



Internal Circuit Diagram

### Absolute Maximum Ratings

$T_C = 25^{\circ}C$  unless otherwise noted

Symbol	Description	FMG2G75US120	Units
$V_{CES}$	Collector-Emitter Voltage	1200	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current	75	A
$I_{CM(1)}$	Pulsed Collector Current	150	A
$I_F$	Diode Continuous Forward Current	75	A
$I_{FM}$	Diode Maximum Forward Current	150	A
$P_D$	Maximum Power Dissipation	445	W
$T_{SC}$	Short Circuit Withstand Time @ $T_C = 100^{\circ}C$	10	us
$T_J$	Operating Junction Temperature	-40 to +150	$^{\circ}C$
$T_{STG}$	Storage Temperature Range	-40 to +125	$^{\circ}C$
$V_{ISO}$	Isolation Voltage @ AC 1minute	2500	V
Mounting Torque	Power Terminal Screw : M5	4.0	N.m
	Mounting Screw : M5	4.0	N.m

Notes :  
(1) Repetitive rating : Pulse width limited by max. junction temperature

**Electrical Characteristics of IGBT** $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 3mA$	1200	--	--	V
$\Delta BV_{CES} / \Delta T_J$	Temperature Coeff. of Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	--	0.6	--	V/ $^\circ\text{C}$
$I_{CES}$	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	3	mA
$I_{GES}$	Gate - Emitter Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	$\pm 100$	nA

**On Characteristics**

$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$I_C = 75mA, V_{CE} = V_{GE}$	5.0	7.0	8.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 75A, V_{GE} = 15V$	--	2.6	3.0	V

**Switching Characteristics**

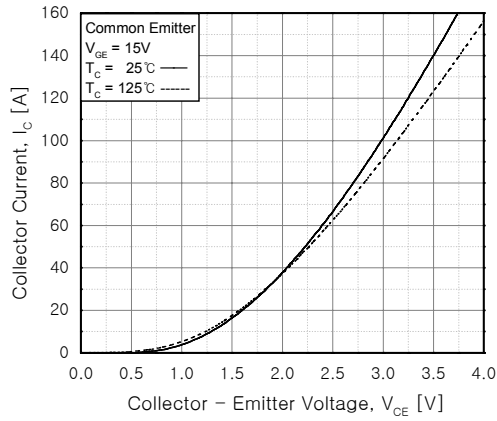
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 75A,$ $R_G = 10\Omega, V_{GE} = 15V,$ Inductive Load, $T_C = 25^\circ\text{C}$	--	75	--	ns
$t_r$	Rise Time		--	80	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	295	--	ns
$t_f$	Fall Time		--	50	150	ns
$E_{on}$	Turn-On Switching Loss		--	6.9	--	mJ
$E_{off}$	Turn-Off Switching Loss	$V_{CC} = 600V, I_C = 75A,$ $R_G = 10\Omega, V_{GE} = 15V,$ Inductive Load, $T_C = 125^\circ\text{C}$	--	4.3	--	mJ
$t_{d(on)}$	Turn-On Delay Time		--	80	--	ns
$t_r$	Rise Time		--	80	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	310	--	ns
$t_f$	Fall Time		--	70	--	ns
$E_{on}$	Turn-On Switching Loss	$V_{CC} = 600V, V_{GE} = 15V$ @ $T_C = 100^\circ\text{C}$	--	8.4	--	mJ
$E_{off}$	Turn-Off Switching Loss		--	5.6	--	mJ
$T_{sc}$	Short Circuit Withstand Time	$V_{CC} = 600V, V_{GE} = 15V$ @ $T_C = 100^\circ\text{C}$	10	--	--	us
$Q_g$	Total Gate Charge	$V_{CE} = 300V, I_C = 75A,$ $V_{GE} = 15V$	--	570	--	nC
$Q_{ge}$	Gate-Emitter Charge		--	90	--	nC
$Q_{gc}$	Gate-Collector Charge		--	310	--	nC

**Electrical Characteristics of DIODE** $T_C = 25^\circ\text{C}$  unless otherwise noted

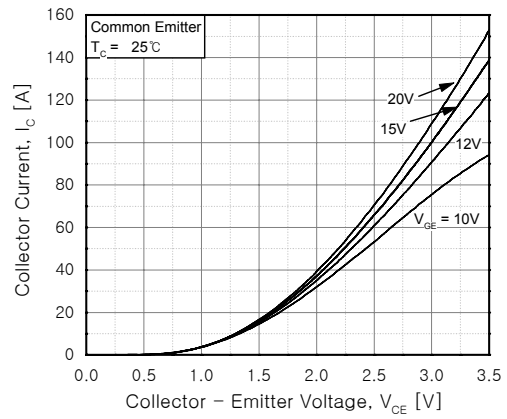
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V <sub>FM</sub>	Diode Forward Voltage	I <sub>F</sub> = 75A	T <sub>C</sub> = 25°C	--	2.3	3.0	V
			T <sub>C</sub> = 125°C	--	2.2	--	
t <sub>rr</sub>	Diode Reverse Recovery Time	I <sub>F</sub> = 75A di / dt = 1000 A/us	T <sub>C</sub> = 25°C	--	150	--	ns
			T <sub>C</sub> = 125°C	--	225	--	
I <sub>rr</sub>	Diode Peak Reverse Recovery Current		T <sub>C</sub> = 25°C	--	47	--	A
			T <sub>C</sub> = 125°C	--	61	--	
Q <sub>rr</sub>	Diode Reverse Recovery Charge		T <sub>C</sub> = 25°C	--	3525		nC
			T <sub>C</sub> = 125°C	--	6863	--	

**Thermal Characteristics**

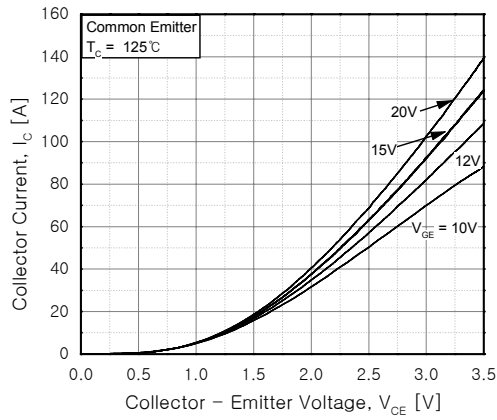
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)	--	0.28	$^\circ\text{C/W}$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)	--	0.34	$^\circ\text{C/W}$
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.035	--	$^\circ\text{C/W}$
Weight	Weight of Module	240	--	g



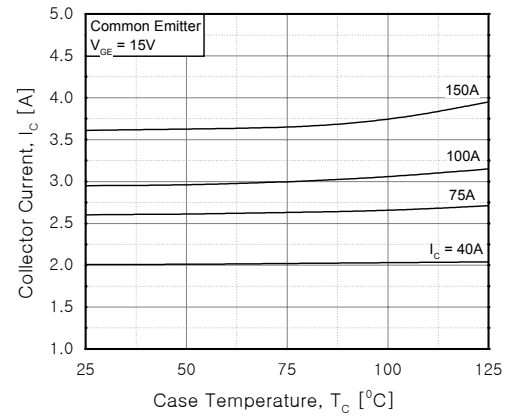
**Fig 1. Typical Output Characteristics**



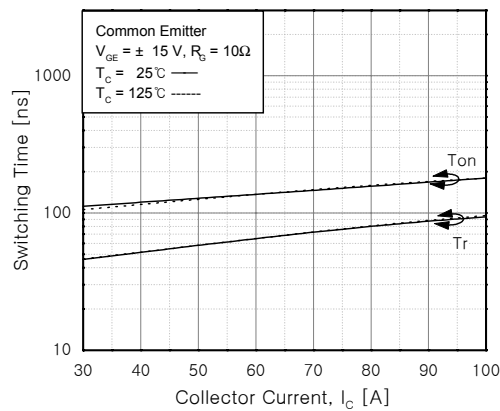
**Fig 2. Typical Saturation Voltage Characteristics**



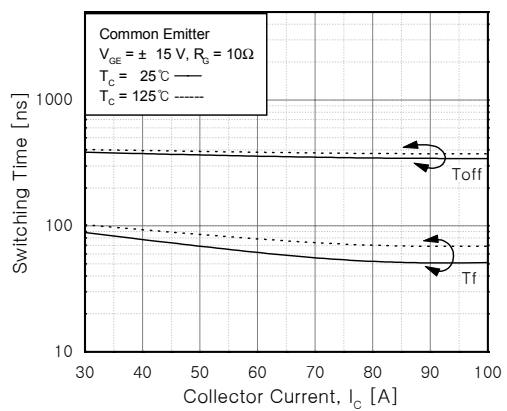
**Fig 3. Typical Saturation Voltage Characteristics**



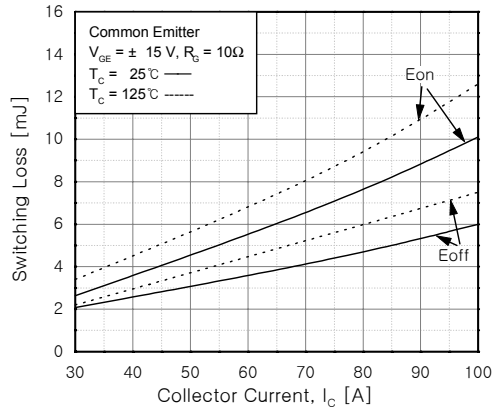
**Fig 4. Saturation Voltage vs. Case Temperature at Variant Current Level**



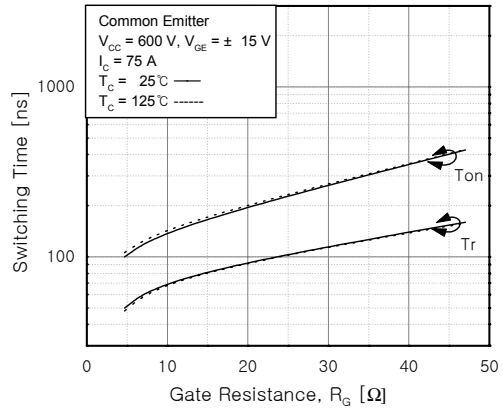
**Fig 5. Turn-On Characteristics vs. Collector Current**



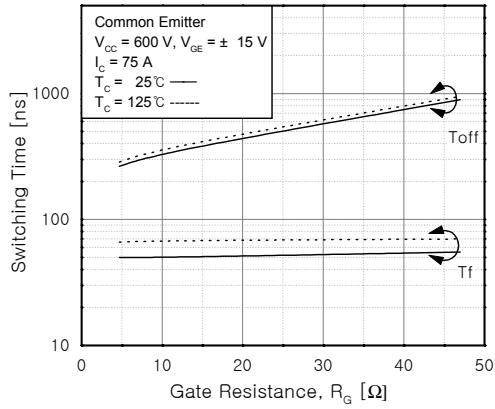
**Fig 6. Turn-Off Characteristics vs. Collector Current**



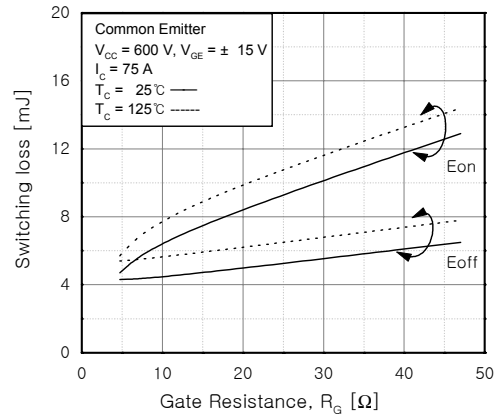
**Fig 7. Switching Loss vs. Collector Current**



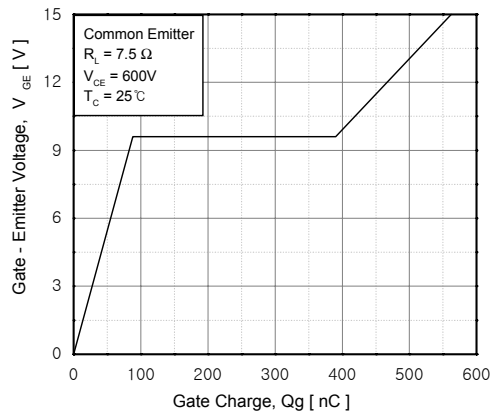
**Fig 8. Turn-on Characteristics vs. Gate Resistance**



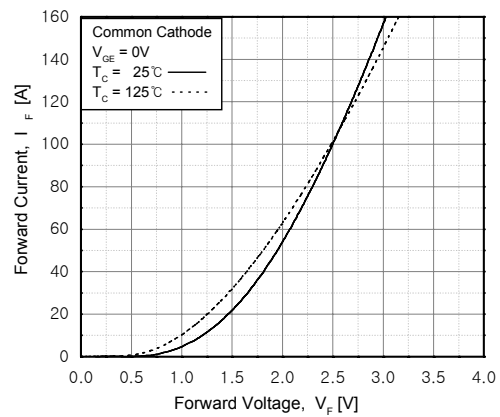
**Fig 9. Turn-Off Characteristics vs. Gate Resistance**



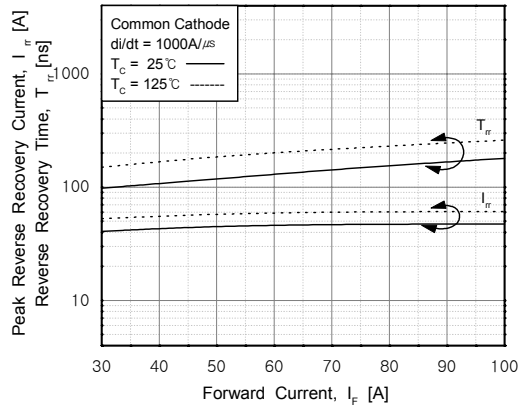
**Fig 10. Switching Loss vs. Gate Resistance**



**Fig 11. Gate Charge Characteristics**



**Fig 12. Forward Characteristics(diode)**



**Fig 13. Reverse Recovery Characteristics(diode)**

Dimensions in Millimeters

**FMG2G75US120**

Technical drawing showing the front and side views of a rectangular electronic component with dimensions and labels.

**Front View Dimensions:**

- Overall width:  $93 \pm 0.5$
- Overall height:  $35 \pm 0.6$
- Top section width:  $40 \pm 0.5$
- Top section height:  $4 \pm 0.6$
- Bottom section width:  $80 \pm 0.5$
- Bottom section height:  $4 \pm 0.6$
- Internal width segments:  $23 \pm 0.5$ ,  $23 \pm 0.5$
- Internal height segments:  $12 \pm 0.6$ ,  $17 \pm 0.6$
- Left side feature:  $2 - \varnothing 5.4 \pm 0.3$
- Internal feature:  $3 - M5$
- Labels: C2E1, E2, C1, G2, E2, E1, G1

**Side View Dimensions:**

- Overall width:  $90 \pm 0.5$
- Overall height:  $22.3 - 0.6$
- Top section width:  $16 \pm 0.5$
- Top section height:  $7.7 \pm 0.5$
- Internal width segments:  $10 \pm 0.5$ ,  $10 \pm 0.5$ ,  $10 \pm 0.5$
- Internal height segments:  $5.8 \pm 0.6$ ,  $31.8 - 0.6$
- Right side feature:  $28.1 \pm 0.5$
- Bottom section width:  $32 \pm 0.5$

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FMG2G75US120 Rev. A

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